

# Music Dataset classification



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21.06.08

# Dataset statistics of single label - 900 features

| Dataset                 | Patterns | Features |         | # of Classes | Average Patterns per Class $\pm$ Standard Deviation | Domain           | 길이 구분           |
|-------------------------|----------|----------|---------|--------------|-----------------------------------------------------|------------------|-----------------|
|                         |          | Size     | Type    |              |                                                     |                  |                 |
| GTZAN                   | 1000     | 888      | Numeric | 10           | 100.000 $\pm$ 0.000                                 | Genre            | 30s             |
| HOMBURG                 | 1886     | 888      | Numeric | 9            | 209.556 $\pm$ 134.866                               | Genre            | 10s             |
| FMA_SMALL               | 7996     | 888      | Numeric | 8            | 999.500 $\pm$ 0.500                                 | Genre            | 30s             |
| MER500                  | 493      | 888      | Numeric | 5            | 98.600 $\pm$ 2.332                                  | Emotion          | 30s $\pm$ 30s   |
| emoMusic                | 1000     | 888      | Numeric | 8            | 125.000 $\pm$ 0.000                                 | Emotion          | 45s             |
| Soundtracks             | 470      | 884      | Numeric | 9            | 52.222 $\pm$ 19.876                                 | Emotion          | 24s $\pm$ 14s   |
| Emotifymusic            | 400      | 888      | Numeric | 4            | 100.000 $\pm$ 0.000                                 | Genre            | 43 $\pm$ 18s    |
| Ballroom                | 698      | 888      | Numeric | 8            | 87.250 $\pm$ 17.555                                 | Genre            | 30s             |
| SeyerlehnerUnique       | 3115     | 888      | Numeric | 10           | 311.500 $\pm$ 248.349                               | Genre            | 30s             |
| MIREX-like_mood         | 903      | 884      | Numeric | 28           | 32.250 $\pm$ 4.778                                  | Mood             | 30s             |
| Medley-solos            | 21571    | 873      | Numeric | 8            | 2537.875 $\pm$ 2016.080                             | Instrument       | 3s              |
| ISMIR04                 | 727      | -        | Numeric | 6            | 121.167 $\pm$ 95.602                                | Genre            | 30s             |
| good-sounds             | 8399     | 865      | Numeric | 5            | 549.400 $\pm$ 198.697                               | Instrument       | 9s $\pm$ 9s     |
| MICM                    | 1137     | 888      | Numeric | 7            | 162.429 $\pm$ 119.717                               | Modal System     | 6m $\pm$ 6m     |
| Tropical Genres         | 1500     | 888      | Numeric | 5            | 300.000 $\pm$ 0.000                                 | Genre            | 30s             |
| PCMIR                   | 2410     | 886      | Numeric | 6            | 401.667 $\pm$ 46.241                                | Instrument       | 5s              |
| extendedBallroom        | 4180     | 888      | Numeric | 13           | 321.538 $\pm$ 195.702                               | Genre            | 2m $\pm$ 2m     |
| giantsteps_tempo        | 664      | 888      | Numeric | 23           | 28.870 $\pm$ 31.872                                 | Tempo            | 1m30s $\pm$ 30s |
| giantsteps_key          | 604      | 888      | Numeric | 24           | 25.167 $\pm$ 20.418                                 | Key              | 1m20s $\pm$ 40s |
| GMD                     | 1042     | 888      | Numeric | 18           | 57.889 $\pm$ 70.069                                 | Genre            | 5m $\pm$ 5m     |
| FMA_MEDIUM              | 24984    | 888      | Numeric | 16           | 1561.500 $\pm$ 2069.356                             | Genre            | 30s             |
| IRMAS                   | 6700     | -        | Numeric | 5            | -                                                   | Instrument       | 2s              |
| MagnaTagATune_emotion   | 25860    | 888      | Numeric | 17           | -                                                   | Emotion          | 30s             |
| MagnaTagATune_genre     | 25860    | 888      | Numeric | 58           | -                                                   | Genre            | 30s             |
| MagnaTagATune_top50     | 25860    | 888      | Numeric | 45           | -                                                   | Instrument       | 30s             |
| MagnaTagATune           | 25860    | 888      | Numeric | 9            | -                                                   | Tempo            | 30s             |
| CAL500_emotion          | 498      | 1277     | Numeric | 27           | -                                                   | Emotion          | 11m $\pm$ 11m   |
| CAL500_instrument&vocal | 482      | 888      | Numeric | 14           | -                                                   | Instrument&Vocal | 11m $\pm$ 11m   |
| CAL500_genre            | 449      | 888      | Numeric | 12           | -                                                   | Genre            | 11m $\pm$ 11m   |

# Dataset statistics of single label - 400 features

| Dataset                 | Patterns | Features |         | # of Classes | Average Patterns per Class $\pm$ Standard Deviation | Domain           | 길이 구분           |
|-------------------------|----------|----------|---------|--------------|-----------------------------------------------------|------------------|-----------------|
|                         |          | Size     | Type    |              |                                                     |                  |                 |
| GTZAN                   | 1000     | 389      | Numeric | 10           | 100.000 $\pm$ 0.000                                 | Genre            | 30s             |
| HOMBURG                 | 1886     | 389      | Numeric | 9            | 209.556 $\pm$ 134.866                               | Genre            | 10s             |
| FMA_SMALL               | 7996     | 389      | Numeric | 8            | 999.500 $\pm$ 0.500                                 | Genre            | 30s             |
| MER500                  | 493      | 389      | Numeric | 5            | 98.600 $\pm$ 2.332                                  | Emotion          | 30s $\pm$ 30s   |
| emoMusic                | 1000     | 389      | Numeric | 8            | 125.000 $\pm$ 0.000                                 | Emotion          | 45s             |
| Soundtracks             | 470      | 389      | Numeric | 9            | 52.222 $\pm$ 19.876                                 | Emotion          | 24s $\pm$ 14s   |
| Emotifymusic            | 400      | 389      | Numeric | 4            | 100.000 $\pm$ 0.000                                 | Genre            | 43 $\pm$ 18s    |
| Ballroom                | 698      | 389      | Numeric | 8            | 87.250 $\pm$ 17.555                                 | Genre            | 30s             |
| SeyerlehnerUnique       | 3115     | 389      | Numeric | 10           | 311.500 $\pm$ 248.349                               | Genre            | 30s             |
| MIREX-like_mood         | 903      | 385      | Numeric | 28           | 32.250 $\pm$ 4.778                                  | Mood             | 30s             |
| Medley-solos            | 21571    | 384      | Numeric | 8            | 2537.875 $\pm$ 2016.080                             | Instrument       | 3s              |
| ISMIR04                 | 727      | 389      | Numeric | 6            | 121.167 $\pm$ 95.602                                | Genre            | 30s             |
| good-sounds             | 8399     | 371      | Numeric | 5            | 549.400 $\pm$ 198.697                               | Instrument       | 9s $\pm$ 9s     |
| MICM                    | 1137     | 389      | Numeric | 7            | 162.429 $\pm$ 119.717                               | Modal System     | 6m $\pm$ 6m     |
| Tropical Genres         | 1500     | 389      | Numeric | 5            | 300.000 $\pm$ 0.000                                 | Genre            | 30s             |
| PCMIR                   | 2410     | 387      | Numeric | 6            | 401.667 $\pm$ 46.241                                | Instrument       | 5s              |
| extendedBallroom        | 4180     | 389      | Numeric | 13           | 321.538 $\pm$ 195.702                               | Genre            | 2m $\pm$ 2m     |
| giantsteps_tempo        | 664      | 389      | Numeric | 23           | 28.870 $\pm$ 31.872                                 | Tempo            | 1m30s $\pm$ 30s |
| giantsteps_key          | 604      | 389      | Numeric | 24           | 25.167 $\pm$ 20.418                                 | Key              | 1m20s $\pm$ 40s |
| GMD                     | 1042     | 389      | Numeric | 18           | 57.889 $\pm$ 70.069                                 | Genre            | 5m $\pm$ 5m     |
| FMA_MEDIUM              | 24984    | 389      | Numeric | 16           | 1561.500 $\pm$ 2069.356                             | Genre            | 30s             |
| IRMAS                   | 6700     | -        | Numeric | 5            | -                                                   | Instrument       | 2s              |
| MagnaTagATune_emotion   | 25860    | -        | Numeric | 17           | -                                                   | Emotion          | 30s             |
| MagnaTagATune_genre     | 25860    | -        | Numeric | 58           | -                                                   | Genre            | 30s             |
| MagnaTagATune_top50     | 25860    | -        | Numeric | 45           | -                                                   | Instrument       | 30s             |
| MagnaTagATune           | 25860    | -        | Numeric | 9            | -                                                   | Tempo            | 30s             |
| CAL500_emotion          | 498      | -        | Numeric | 27           | -                                                   | Emotion          | 11m $\pm$ 11m   |
| CAL500_instrument&vocal | 482      | -        | Numeric | 14           | -                                                   | Instrument&Vocal | 11m $\pm$ 11m   |
| CAL500_genre            | 449      | -        | Numeric | 12           | -                                                   | Genre            | 11m $\pm$ 11m   |

# Experimental settings(KNN/NB)-900 features

| Dataset                 | KNN(standardize=1)     | NB + laim              |
|-------------------------|------------------------|------------------------|
| GTZAN                   | 0.5980 ± 0.0302        | <b>0.7120 ± 0.0218</b> |
| HOMBURG                 | 0.2133 ± 0.0244        | <b>0.2761 ± 0.0155</b> |
| FMA_SMALL               | <b>0.2193 ± 0.0085</b> | 0.1882 ± 0.0110        |
| MER500                  | 0.4949 ± 0.0417        | <b>0.7214 ± 0.0363</b> |
| emoMusic                | 0.1610 ± 0.0288        | <b>0.2970 ± 0.0193</b> |
| Soundtracks             | 0.1528 ± 0.0365        | <b>0.4306 ± 0.0477</b> |
| Emotifymusic            | 0.6250 ± 0.0559        | <b>0.7275 ± 0.0381</b> |
| Ballroom                | 0.5065 ± 0.0324        | <b>0.7525 ± 0.0451</b> |
| SeyerlehnerUnique       | <b>0.6116 ± 0.0194</b> | 0.6031 ± 0.0152        |
| MIREX-like_mood         | 0.0583 ± 0.0142        | <b>0.1728 ± 0.0335</b> |
| Medley-solos            | <b>0.9164 ± 0.0057</b> | 0.7484 ± 0.0030        |
| ISMIR04                 | -                      | -                      |
| good-sounds             | <b>0.1068 ± 0.0053</b> | 0.0833 ± 0.0073        |
| MICM                    | 0.0714 ± 0.0149        | 0.0758 ± 0.0205        |
| Tropical Genres         | 0.9130 ± 0.0190        | <b>0.9160 ± 0.0102</b> |
| PCMR                    | 0.7618 ± 0.0183        | <b>0.7772 ± 0.0163</b> |
| extendedBallroom        | 0.3754 ± 0.1143        | <b>0.5311 ± 0.0199</b> |
| giantsteps_tempo        | <b>0.1788 ± 0.0301</b> | 0.0523 ± 0.0610        |
| giantsteps_key          | 0.0625 ± 0.0201        | <b>0.1267 ± 0.0500</b> |
| GMD                     | <b>0.2139 ± 0.0144</b> | 0.1851 ± 0.0261        |
| FMA_MEDIUM              | <b>0.5426 ± 0.0058</b> | 0.4653 ± 0.0075        |
| IRMAS                   | -                      | -                      |
| MagnaTagATune_emotion   | -                      | -                      |
| MagnaTagATune_genre     | -                      | -                      |
| MagnaTagATune_top50     | -                      | -                      |
| MagnaTagATune           | -                      | -                      |
| CAL500_emotion          | -                      | -                      |
| CAL500_instrument&vocal | -                      | -                      |
| CAL500_genre            | -                      | -                      |

- Overall Settings
  - 8:2 hold-out cross validation
  - “NaN” values were treated by KNN Imputer
  - Datasets consists of 900 under features
  - Experiment Iterations = 10
- KNN settings
  - KNN classifier (k=3)
  - Standardize = TRUE
  - Distance = cosine
- NB settings
  - Numeric type of datasets were dicretized by using laim discretization algorithm

# Experimental settings(KNN/NB)-400 features

| Dataset                 | KNN(standardize)       | NB + laim              |
|-------------------------|------------------------|------------------------|
| GTZAN                   | 0.5980 ± 0.0304        | <b>0.7220 ± 0.0270</b> |
| HOMBURG                 | 0.4194 ± 0.0231        | <b>0.4645 ± 0.0243</b> |
| FMA_SMALL               | 0.4621 ± 0.0150        | <b>0.4716 ± 0.0107</b> |
| MER500                  | 0.4582 ± 0.0286        | <b>0.7837 ± 0.0339</b> |
| emoMusic                | 0.2105 ± 0.0332        | <b>0.3325 ± 0.0399</b> |
| Soundtracks             | 0.2223 ± 0.0390        | <b>0.3436 ± 0.0420</b> |
| Emotifymusic            | 0.6388 ± 0.0356        | <b>0.7100 ± 0.0337</b> |
| Ballroom                | 0.5129 ± 0.0408        | <b>0.8158 ± 0.0212</b> |
| SeyerlehnerUnique       | 0.6019 ± 0.0168        | <b>0.6504 ± 0.0197</b> |
| MIREX-like_mood         | 0.0567 ± 0.0110        | <b>0.1828 ± 0.0289</b> |
| Medley-solos            | <b>0.8985 ± 0.0056</b> | 0.7665 ± 0.0063        |
| ISMIR04                 | <b>0.7814 ± 0.0309</b> | 0.7593 ± 0.0235        |
| good-sounds             | <b>0.1070 ± 0.0054</b> | 0.0818 ± 0.0055        |
| MICM                    | 0.0678 ± 0.0140        | <b>0.0996 ± 0.0321</b> |
| Tropical Genres         | 0.9290 ± 0.0187        | <b>0.9317 ± 0.0149</b> |
| PCMIR                   | 0.7089 ± 0.0207        | <b>0.7938 ± 0.0101</b> |
| extendedBallroom        | 0.5812 ± 0.0169        | <b>0.7898 ± 0.0145</b> |
| giantsteps_tempo        | 0.1621 ± 0.0650        | <b>0.1909 ± 0.0509</b> |
| giantsteps_key          | 0.0700 ± 0.0292        | <b>0.0817 ± 0.0584</b> |
| GMD                     | <b>0.2803 ± 0.0350</b> | 0.2500 ± 0.0572        |
| FMA_MEDIUM              | <b>0.5376 ± 0.0130</b> | 0.4860 ± 0.0045        |
| IRMAS                   |                        | -                      |
| MagnaTagATune_emotion   |                        | -                      |
| MagnaTagATune_genre     |                        | -                      |
| MagnaTagATune_top50     |                        | -                      |
| MagnaTagATune           |                        | -                      |
| CAL500_emotion          |                        | -                      |
| CAL500_instrument&vocal |                        | -                      |
| CAL500_genre            |                        | -                      |

- Overall Settings
  - 8:2 hold-out cross validation
  - “NaN” values were treated by KNN Imputer
  - Datasets consists of 900 under features
  - Experiment Iterations = 10
- KNN settings
  - KNN classifier (k=3)
  - Standardize = TRUE
  - Distance = cosine
- NB settings
  - Numeric type of datasets were dicretized by using laim discretization algorithm

# Experimental settings(proposed)-900 features

| Dataset                 | Proposed(knn + relieff)               | Proposed(nb + gics)                   |
|-------------------------|---------------------------------------|---------------------------------------|
| GTZAN                   | 0.6505 $\pm$ 0.0194                   | <b>0.7570 <math>\pm</math> 0.0303</b> |
| HOMBURG                 | 0.2011 $\pm$ 0.0289                   | <b>0.3117 <math>\pm</math> 0.0288</b> |
| FMA_SMALL               | <b>0.2527 <math>\pm</math> 0.0132</b> | 0.2014 $\pm$ 0.0156                   |
| MER500                  | 0.5367 $\pm$ 0.0391                   | <b>0.7694 <math>\pm</math> 0.0376</b> |
| emoMusic                | 0.1600 $\pm$ 0.0170                   | 0.2880 $\pm$ 0.0280                   |
| Soundtracks             | 0.1806 $\pm$ 0.0404                   | <b>0.4542 <math>\pm</math> 0.0516</b> |
| Emotifymusic            | 0.1600 $\pm$ 0.0170                   | <b>0.7425 <math>\pm</math> 0.0438</b> |
| Ballroom                | 0.5799 $\pm$ 0.0394                   | <b>0.8367 <math>\pm</math> 0.0464</b> |
| SeyerlehnerUnique       | 0.6542 $\pm$ 0.0234                   | 0.6559 $\pm$ 0.0192                   |
| MIREX-like_mood         | 0.0667 $\pm$ 0.0117                   | 0.1700 $\pm$ 0.0257                   |
| Medley-solos            | -                                     | 0.7870 $\pm$ 0.0065                   |
| ISMIR04                 | -                                     | -                                     |
| good-sounds             | 0.1068 $\pm$ 0.0055                   | <b>0.1999 <math>\pm</math> 0.0061</b> |
| MICM                    | 0.0648 $\pm$ 0.0268                   | <b>0.0780 <math>\pm</math> 0.0320</b> |
| Tropical Genres         | <b>0.9593 <math>\pm</math> 0.0165</b> | 0.9297 $\pm$ 0.0109                   |
| PCMIR                   | <b>0.8662 <math>\pm</math> 0.0175</b> | 0.8201 $\pm$ 0.0159                   |
| extendedBallroom        | 0.3968 $\pm$ 0.1276                   | <b>0.6349 <math>\pm</math> 0.0141</b> |
| giantsteps_tempo        | <b>0.1955 <math>\pm</math> 0.0278</b> | 0.0523 $\pm$ 0.0610                   |
| giantsteps_key          | 0.0567 $\pm$ 0.0235                   | <b>0.1375 <math>\pm</math> 0.0450</b> |
| GMD                     | 0.2115 $\pm$ 0.0213                   | <b>0.2625 <math>\pm</math> 0.0263</b> |
| FMA_MEDIUM              | -                                     | 0.5198 $\pm$ 0.0088                   |
| IRMAS                   | -                                     | -                                     |
| MagnaTagATune_emotion   | -                                     | -                                     |
| MagnaTagATune_genre     | -                                     | -                                     |
| MagnaTagATune_top50     | -                                     | -                                     |
| MagnaTagATune           | -                                     | -                                     |
| CAL500_emotion          | -                                     | -                                     |
| CAL500_instrument&vocal | -                                     | -                                     |
| CAL500_genre            | -                                     | -                                     |

- Overall Settings
  - 8:2 hold-out cross validation
  - “NaN” values were treated by KNN Imputer
  - Datasets consists of 900 under features
  - Experiment Iterations = 10
- KNN settings
  - KNN classifier (k=3)
  - Standardize = TRUE
  - Distance = cosine
- NB settings
  - Numeric type of datasets were dicretized by using laim discretization algorithm
- Proposed
  - Initial population : 50
  - FFCS : 300
  - Initialization : 101 Initialization
  - Evaluation : KNN + Relieff, Naïve Bayes + GICS

# Comparison - 900 features

| Dataset                 | KNN(standardize=1) | KNN(cosine)            | NB + laim              | Proposed(knn + relief) | Proposed(nb + gics)    |
|-------------------------|--------------------|------------------------|------------------------|------------------------|------------------------|
| GTZAN                   | 0.5980 ± 0.0302    | 0.6385 ± 0.0285        | 0.7120 ± 0.0218        | 0.6505 ± 0.0194        | <b>0.7570 ± 0.0303</b> |
| HOMBURG                 | 0.2133 ± 0.0244    | 0.2077 ± 0.0297        | 0.2761 ± 0.0155        | 0.2011 ± 0.0289        | <b>0.3117 ± 0.0288</b> |
| FMA_SMALL               | 0.2193 ± 0.0085    | <b>0.2338 ± 0.0081</b> | 0.1882 ± 0.0110        | <b>0.2527 ± 0.0132</b> | 0.2014 ± 0.0156        |
| MER500                  | 0.4949 ± 0.0417    | 0.5449 ± 0.0428        | 0.7214 ± 0.0363        | 0.5367 ± 0.0391        | <b>0.7694 ± 0.0376</b> |
| emoMusic                | 0.1610 ± 0.0288    | 0.1635 ± 0.0201        | <b>0.2970 ± 0.0193</b> | 0.1600 ± 0.0170        | 0.2880 ± 0.0280        |
| Soundtracks             | 0.1528 ± 0.0365    | 0.1972 ± 0.0485        | 0.4306 ± 0.0477        | 0.1806 ± 0.0404        | <b>0.4542 ± 0.0516</b> |
| Emotifymusic            | 0.6250 ± 0.0559    | 0.6975 ± 0.0510        | 0.7275 ± 0.0381        | 0.1600 ± 0.0170        | <b>0.7425 ± 0.0438</b> |
| Ballroom                | 0.5065 ± 0.0324    | 0.5583 ± 0.0327        | 0.7525 ± 0.0451        | 0.5799 ± 0.0394        | <b>0.8367 ± 0.0464</b> |
| SeyerlehnerUnique       | 0.6116 ± 0.0194    | <b>0.6595 ± 0.0156</b> | 0.6031 ± 0.0152        | 0.6542 ± 0.0234        | 0.6559 ± 0.0192        |
| MIREX-like_mood         | 0.0583 ± 0.0142    | 0.0667 ± 0.0176        | <b>0.1728 ± 0.0335</b> | 0.0667 ± 0.0117        | 0.1700 ± 0.0257        |
| Medley-solos            | 0.9164 ± 0.0057    | <b>0.9350 ± 0.0030</b> | 0.7484 ± 0.0030        | -                      | 0.7870 ± 0.0065        |
| ISMIR04                 | -                  | -                      | -                      | -                      | -                      |
| good-sounds             | 0.1068 ± 0.0053    | 0.1067 ± 0.0054        | 0.0833 ± 0.0073        | 0.1068 ± 0.0055        | <b>0.1999 ± 0.0061</b> |
| MICM                    | 0.0714 ± 0.0149    | 0.0621 ± 0.0159        | 0.0758 ± 0.0205        | 0.0648 ± 0.0268        | <b>0.0780 ± 0.0320</b> |
| Tropical Genres         | 0.9130 ± 0.0190    | 0.9220 ± 0.0164        | 0.9160 ± 0.0102        | <b>0.9593 ± 0.0165</b> | 0.9297 ± 0.0109        |
| PCMIR                   | 0.7618 ± 0.0183    | 0.8193 ± 0.0184        | 0.7772 ± 0.0163        | <b>0.8662 ± 0.0175</b> | 0.8201 ± 0.0159        |
| extendedBallroom        | 0.3754 ± 0.1143    | 0.3959 ± 0.1242        | 0.5311 ± 0.0199        | 0.3968 ± 0.1276        | <b>0.6349 ± 0.0141</b> |
| giantsteps_tempo        | 0.1788 ± 0.0301    | 0.1902 ± 0.0375        | 0.0523 ± 0.0610        | <b>0.1955 ± 0.0278</b> | 0.0523 ± 0.0610        |
| giantsteps_key          | 0.0625 ± 0.0201    | 0.0625 ± 0.0249        | 0.1267 ± 0.0500        | 0.0567 ± 0.0235        | <b>0.1375 ± 0.0450</b> |
| GMD                     | 0.2139 ± 0.0144    | 0.2212 ± 0.0181        | 0.1851 ± 0.0261        | 0.2115 ± 0.0213        | <b>0.2625 ± 0.0263</b> |
| FMA_MEDIUM              | 0.5426 ± 0.0058    | <b>0.5733 ± 0.0059</b> | 0.4653 ± 0.0075        | -                      | 0.5198 ± 0.0088        |
| IRMAS                   | -                  | -                      | -                      | -                      | -                      |
| MagnaTagATune_emotion   | -                  | -                      | -                      | -                      | -                      |
| MagnaTagATune_genre     | -                  | -                      | -                      | -                      | -                      |
| MagnaTagATune_top50     | -                  | -                      | -                      | -                      | -                      |
| MagnaTagATune           | -                  | -                      | -                      | -                      | -                      |
| CAL500_emotion          | -                  | -                      | -                      | -                      | -                      |
| CAL500_instrument&vocal | -                  | -                      | -                      | -                      | -                      |
| CAL500_genre            | -                  | -                      | -                      | -                      | -                      |

# Comparison

| Dataset                 | MPGA-LCC | MLACO |   |   |
|-------------------------|----------|-------|---|---|
| GTZAN                   | -        | -     | - | - |
| HOMBURG                 | -        | -     | - | - |
| FMA_SMALL               | -        | -     | - | - |
| MER500                  | -        | -     | - | - |
| emoMusic                | -        | -     | - | - |
| Soundtracks             | -        | -     | - | - |
| Emotifymusic            | -        | -     | - | - |
| Ballroom                | -        | -     | - | - |
| SeyerlehnerUnique       | -        | -     | - | - |
| MIREX-like_mood         | -        | -     | - | - |
| Medley-solos            | -        | -     | - | - |
| ISMIR04                 | -        | -     | - | - |
| good-sounds             | -        | -     | - | - |
| MICM                    | -        | -     | - | - |
| Tropical Genres         | -        | -     | - | - |
| PCMIR                   | -        | -     | - | - |
| extendedBallroom        | -        | -     | - | - |
| giantsteps_tempo        | -        | -     | - | - |
| giantsteps_key          | -        | -     | - | - |
| GMD                     | -        | -     | - | - |
| FMA_MEDIUM              | -        | -     | - | - |
| IRMAS                   | -        | -     | - | - |
| MagnaTagATune_emotion   | -        | -     | - | - |
| MagnaTagATune_genre     | -        | -     | - | - |
| MagnaTagATune_top50     | -        | -     | - | - |
| MagnaTagATune           | -        | -     | - | - |
| CAL500_emotion          | -        | -     | - | - |
| CAL500_instrument&vocal | -        | -     | - | - |
| CAL500_genre            | -        | -     | - | - |



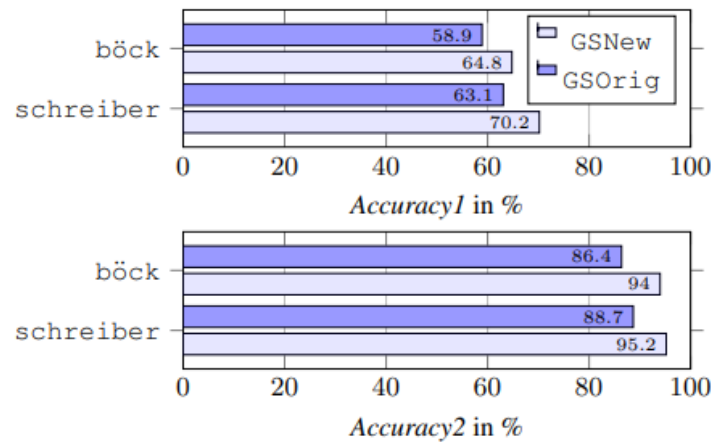
# Accuracies in other papers

## 1. MICM

TABLE III. DNN RESULTS WITHOUT GRU AND BOTTELNECH

| Name of Dastgah | Precision | Recall | F1    |
|-----------------|-----------|--------|-------|
| Shour           | 96.35     | 85.94  | 90.85 |
| Homayoun        | 75.34     | 81.28  | 78.20 |
| Mahour          | 90.42     | 87.12  | 88.74 |
| Segah           | 81.79     | 86.16  | 83.92 |
| Chahargah       | 62.23     | 86.57  | 72.41 |
| Rastpanjgah     | 88.06     | 90.74  | 89.38 |
| Nava            | 94.57     | 86.10  | 90.14 |

## 2. Giantsteps\_tempo



**Figure 9:** Accuracies for the algorithms böck and schreiber measured against both GSOrig and GSNew.

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# Appendix

# A review of population initialization techniques for EA

Main goal of those studies are

1. Increase the probability of finding global optima
2. Reduce the variation of final searching results
3. Decrease the computational costs
4. Improve the solution quality

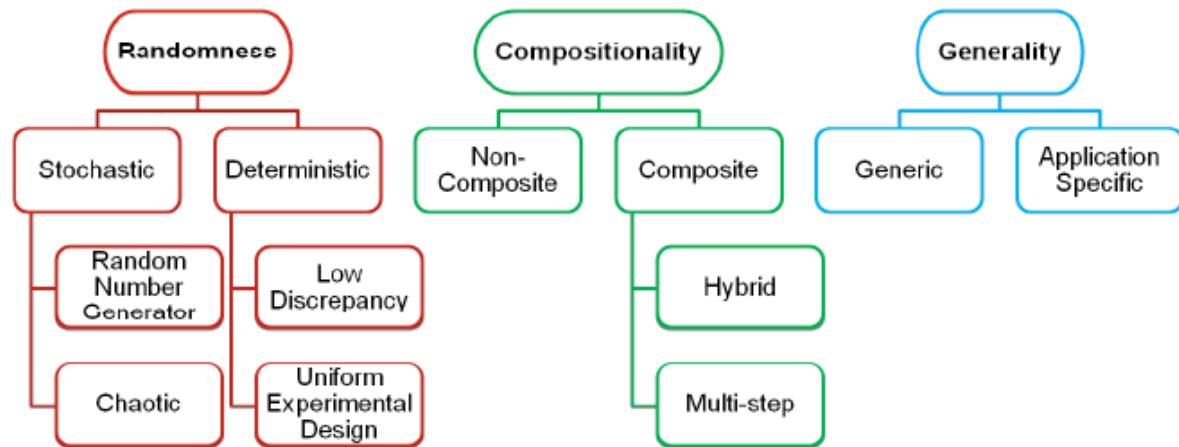


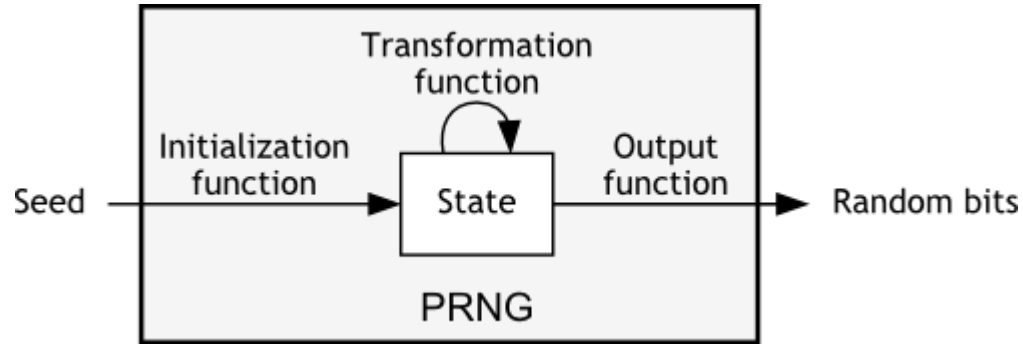
Fig. 1. Three categorizations of population initialization techniques, based on randomness, compositionality and generality.

# A review of population initialization techniques for EA

## Randomness

### Stochastic Technique

- Pseudo-Random Number Generator (PRNG)



- Chaotic Number Generators (CNG)
  - Improve performance in terms of population diversity, success rate, convergence speed

### Deterministic Technique (low-discrepancy techniques)

- Quasi-Random Sequence (QRS)
  - Discrepancy calculation > running several EA runs
- Uniform Experimental Design (UED)

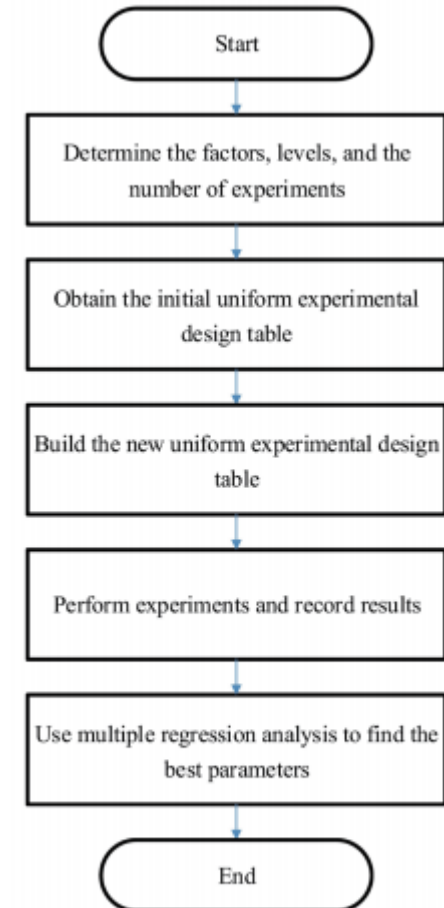


Fig. 2. Flow chart of the UED method.

# A review of population initialization techniques for EA

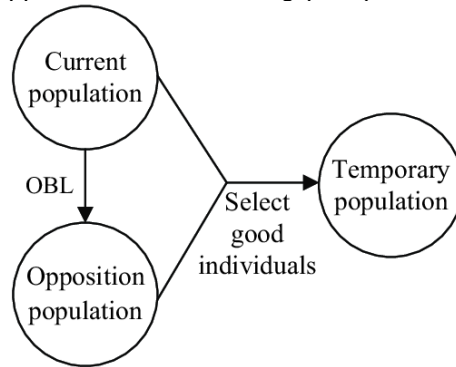
## Compositionality

### Non-compositional

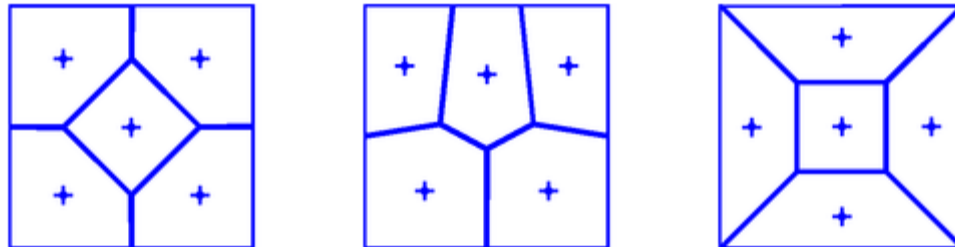
- Only one single step

### Compositional

- Comprise more than one stage
- Hybrid : Separately applied as a non-compositional technique
- Multi-step techniques : At least one of techniques cannot be employed as a standalone initializer
  - Opposition based learning (OBL)



- Centroidal Voronoi Tessellation (CVT)



# **A review of population initialization techniques for EA**

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## **Generality**

- **Generic**
  - Can be directly applied to all types of optimization problems
  - No specific knowledge about the region of interest or building blocks of potential solution is available before running the EA
- **Application Specific**
  - Specially designed to be applied to particular real-world problems